

CLAIMS

1. A method for testing the operation of a cellular radio system comprising at least one terminal and a network element which comprises a data network having a system controller, at least one base station controller and at least one base station operationally connected to it; the testing device, which is a fixed part of the cellular radio system, operationally connected to the data network, and over radio path connected to one or more base stations; the method comprising:

controlling at least one base station by the base station controller;
using the data network for the data transmission required by the network element of the radio system;

examining by means of the testing device, which testing device is a fixed part of the cellular radio system, which testing device is operationally connected to the data network, and which testing device is over radio path connected to one or more base stations, the operational condition of the cellular radio system by utilising the data network and the radio connection of the testing device to at least one base station.

2. A method as claimed in claim 1, directing the testing device to establish a two-way radio connection to at least one base station in order to test the operation of the radio system.

3. A method as claimed in claim 1, measuring the data transmission rate of a known transmission path with a time-stamped test signal,

the transmission path comprises the radio path between the testing device and the base station, and a data network, and

the route of the test signal on the transmission path of the cellular radio system is known.

4. A method as claimed in claim 1, directing the testing device to establish a connection over radio path with at least one base station, and the connection is based on time division and it is directed to use one time-slot to test the operation based on the time division of the cellular radio system.

5. A method as claimed in claim 1, directing the testing device to establish a connection over radio path with at least one base station, and the

connection is based on time division and it is directed to use several time-slots to test the operation based on the time division of the cellular radio system.

6. A method as claimed in claim 1, transmitting data in packet switched mode in the connection established between the testing device and the base station in order to test the packet switched transmission.

7. A method as claimed in claim 1, transmitting data in circuit switched mode in the connection established between the testing device and the base station in order to test the circuit switched transmission.

8. A method as claimed in claim 1, directing the testing device to establish a connection over radio path with at least one base station and directing the testing device to perform a forced handover to another base station or to other base stations to test the handover functions of the radio system.

9. A method as claimed in claim 1, directing the testing device to test the operation of at least one register of the radio system by altering the parameters of the testing device which affect the tested registers.

10. A method as claimed in claim 1, controlling and testing in various load conditions the data transmission load of the data network.

11. A method as claimed in claim 1, directing the testing device to establish a connection over radio path with at least one base station, and reducing the transmission power of the testing device and monitoring the sensitivity and operational condition of the receiver of the base station.

12. A method as claimed in claim 1, monitoring the operation of the base station by means of message signals through the data network during testing.

13. A method as claimed in claim 1, transmitting by the base stations of the cellular radio system a known signal over radio path, receiving by the testing device a known signal transmitted by at least one base station,

if an erroneous known signal is received from the monitored base station, sending an error message through the data network.

14. A method as claimed in claim 13, wherein the known signal is a BCCH signal.

15. A method as claimed in claim 1, wherein if the testing fails, sending an error message.

16. A method as claimed in claim 1, wherein the radio system comprises pico cells and, the base station is a base station of a pico cell.

17. A method as claimed in claim 1, wherein the radio system comprises both pico cells and macro cells, and the base station is a base station of a macro cell.

18. A method as claimed in claim 1, wherein the data network is an IP network.

19. A cellular radio system comprising:

at least one terminal and a network element which comprises a data network having a system controller, the data network being arranged to transmit the data required by the network element of the radio system;

at least one base station;

at least one base station controller, the at least one base station being operationally connected to the base station controller, and the base station controller being arranged to control the at least one base station;

a testing device which is a fixed part of the cellular radio system, the testing device being operationally connected to the data network, and the testing device being arranged to be in contact over radio path to one or more base stations; and

the radio system is arranged to examine the operational condition of the cellular radio system by means of the testing device by utilising the data network and the radio connection of the testing device to at least one base station.

20. A cellular radio system as claimed in claim 19, wherein to test the operation of the radio system, it is arranged to direct the testing device to establish a two-way radio connection with at least one base station.

21. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to measure the data transmission rate of the transmission path with a time-stamped test signal,

the transmission path comprises the radio path between the testing device and the base station and a data network, and

the route of the test signal on the transmission path of the cellular radio system is known.

22. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to direct the testing device to establish a connection over radio path with at least one base station, the connection being based on time division and the connection being arranged to use one time-slot to test the operation based on time division.

23. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to direct the testing device to establish a connection over radio path with at least one base station, the connection being based on time division and the connection being arranged to use several time-slots to test the operation based on time division.

24. A cellular radio system as claimed in claim 19, wherein the connection established between the testing device and the base station is arranged to transmit data in packet switched mode to test the packet switched transmission.

25. A cellular radio system as claimed in claim 19, wherein the connection established between the testing device and the base station is arranged to transmit data in circuit switched mode to test the circuit switched transmission.

26. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to direct the testing device to establish a connection over radio path with at least one base station and the radio system is arranged to direct the testing device to perform a forced handover to another base station or to other base stations to test the handover functions of the radio system.

27. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to test the operation of at least one register in the radio system by altering the parameters of the testing device which affect the registers.

28. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to control the data transmission load of the data network and to perform tests in various load conditions of the data network.

29. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to direct the testing device to establish a connection over radio path with at least one base station and the radio system is arranged to reduce the transmission power of the testing device and to monitor the sensitivity and operational condition of the receiver of the base station.

30. A cellular radio system as claimed in claim 19, wherein the radio system is arranged to monitor the operation of the base station by means of message signals through the data network during testing.

31. A cellular radio system as claimed in claim 19, wherein the base station of the cellular radio system are arranged to transmit a known signal over radio path,

the testing device is arranged to receive a known signal transmitted by at least one base station,

if an erroneous known signal is received from the monitored base station, the radio system is arranged to send an error message through the data network.

32. A cellular radio system as claimed in claim 31, wherein the known signal is a BCCH signal.

33. A cellular radio system as claimed in claim 19, wherein if the testing fails, the radio system is arranged to send an error message.

34. A cellular radio system as claimed in claim 19, wherein the radio system comprises pico cells, and the base station is a base station of a pico cell.

35. A cellular radio system as claimed in claim 19, wherein the radio system comprises both pico cells and macro cells, and the base station is a base station of a macro cell.

36. A cellular radio system as claimed in claim 19, wherein the data network is an IP network.

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